

OLYMPIA HIGH SCHOOL
SPH3U: GRADE 11 UNIVERSITY PHYSICS
FINAL EXAM
SEMESTER 1



THURSDAY JANUARY 27, 2011
1:00 – 3:00 AM (2 HOURS)

NAME: _____

TEACHER: Ms. Winkelaar

INCLUDING THIS PAGE, THIS EXAM HAS 7 PAGES. PLEASE CHECK YOUR PAPERS.

THE BREAKDOWN OF THE EXAM IS AS FOLLOWS:

SECTION	QUESTION TYPE(S)	MARKS	SUGGESTED MAXIMUM TIMES PER SECTION (INCLUDES REVIEW)
A: Multiple Choice	5 questions (6 mks) Knowledge and Understanding (4 mks) Application	10	30 minutes
B: Extended Answer	5 questions (13mks) Knowledge and Understanding (51mks) Thinking and Inquiry (16 mks) Application	80	90 minutes
Communication (COM) marked throughout Mathematical <ul style="list-style-type: none">• 2 marks per extended answer question• formula, unit, substitution, final significant digits		10	N/A
Totals		100 marks	120 minutes / 2 hours

Formative (70%)	Summative Projects (10%)	Summative Exam (20%)	Reported Final % (after bonuses and round ups)
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STUDENTS ARE PERMITTED:

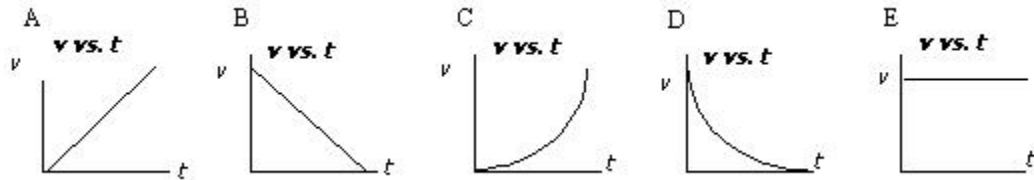
Calculator, Handwritten Approved Formula Sheet

All answers are to appear on the test paper in the spaces provided.

Part A: Multiple Choice Questions (10 marks)

Choose the most appropriate answer for each of the following questions.

1. Which of the following velocity-time graphs represents the motion of a ball thrown vertically upward? (2mks)



- C
 - E
 - A
 - D
 - B
2. . Which of the following would Newton's first law alone NOT account for? (2 mks)
- A rocket accelerates upward from a launch pad and the engines' thrust overcomes gravity.
 - A passenger leans forward in her seat when the car's brakes are applied.
 - Passengers on board an elevator undergoing uniform motion can't tell that the elevator is really moving.
 - No matter how hard you push against it, the boulder would not move.
 - During launch, astronauts feel that they are being pushed back into their seats.
3. A 15.0 kg load of groceries is lifted up from the ground to the fifth floor of an apartment building. Each floor is 5.00 m high. The potential energy of the groceries with respect to the second floor is: (2 mks)
- | | |
|---------------------------------|---------------------------------|
| a. $3.68 \times 10^3 \text{ J}$ | d. $2.20 \times 10^3 \text{ J}$ |
| b. $2.94 \times 10^3 \text{ J}$ | e. $3.0 \times 10^0 \text{ J}$ |
| c. $7.5 \times 10^1 \text{ J}$ | |

4. Consider the following wave properties:

- | | |
|-------|------------|
| (i) | speed |
| (ii) | frequency |
| (iii) | wavelength |
| (iv) | period |

Which of the above quantities does not change as a wave changes mediums? (2 mks)

- | | |
|-----------------------|-----------------------|
| a. (i) only | d. (i) and (iv) only |
| b. (ii) only | e. (ii) and (iv) only |
| c. (i) and (iii) only | |

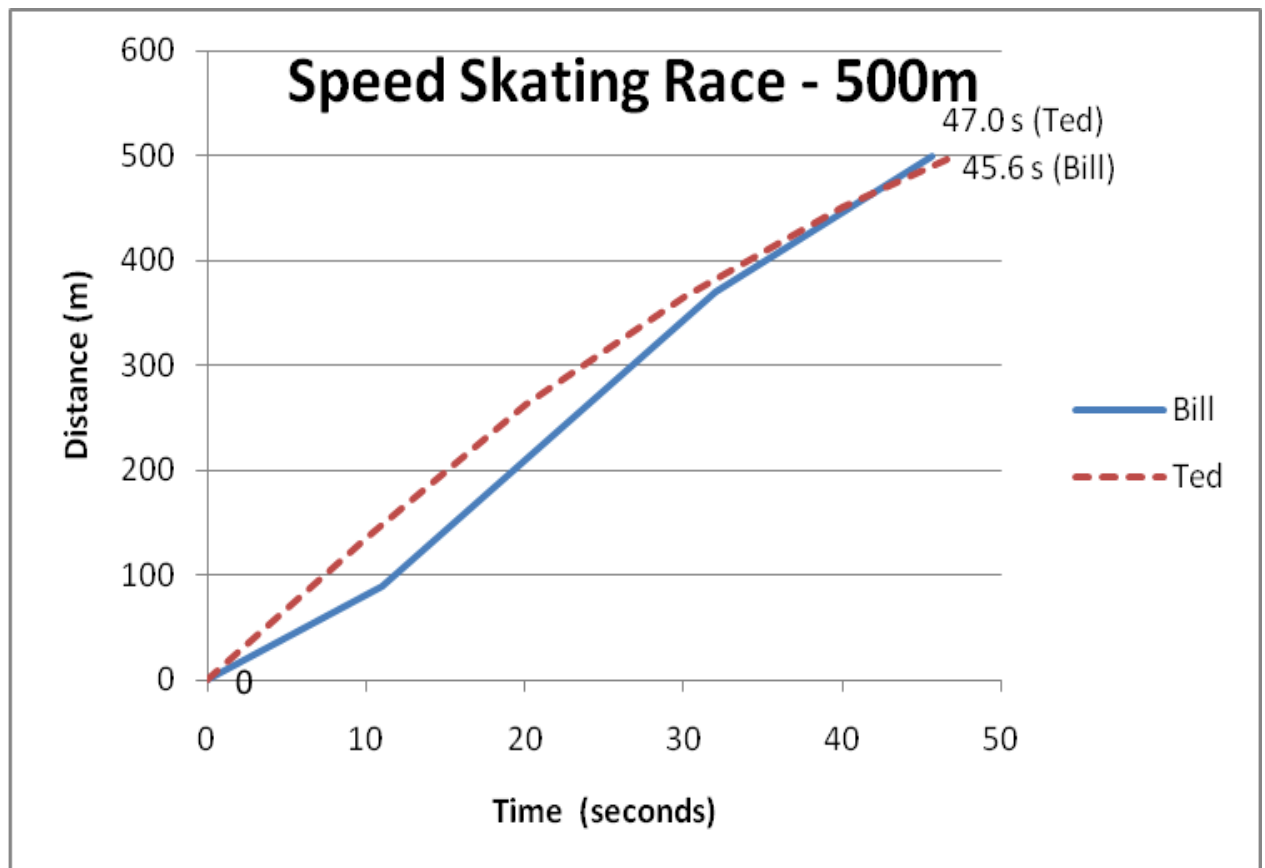
5. Given a $6\ \Omega$ resistor, a $9\ \Omega$ resistor and an 18 V battery, what is the maximum power (in Watts) that can be dissipated? (2 mks)

- | | |
|--------|---------|
| a. 700 | d. 1200 |
| b. 71 | e. 22 |
| c. 90 | |

Part B: Extended Answer Questions (80 marks)

Give full solutions for each of the following questions in the space provided.

1. The position-time graph below represents the motion of two speed skaters, Bill and Ted. (23 mks)



- a. How long did it take Bill and Ted to complete the race? Who won? Who was winning at the 10 second mark? (4 mks)
- b. What was Bill's velocity during the middle portion of the race? (4 mks)
- c. What was Ted's average velocity throughout the race? (3 mks)

d. What was Ted's velocity at 20s? (5 mks)

e. Describe the acceleration of Bill throughout the race. (2 mks)

f. What was Ted's acceleration through the race? (assume constant) (9 mks)

2. In the horizontal starting area of the two-man skeleton race, the two athletes, Dylan (72 kg) and Barry (82 kg), exert a minimum horizontal force of 29 N (fwd) to get their 153 kg sled to begin moving. After the sled has travelled for 11m, Dylan and Barry jump on and the sled has a friction of 33 N. (19 mks)
- Draw a free body diagram of the sled at rest, and after it has travelled 11m, showing all forces and with values. (8 mks)
 - Determine the coefficient of friction. (3 mks)
 - What is the net force exerted on the sled at 11 m? (2 mks)
 - What is the acceleration of the cart on the flat surface at 11m? (3 mks)
 - If the velocity at 11 m is 4.9 m/s, how far could the cart go on the flat before stopping? (3 mks)

3. A 62 kg snowboard cross racer, Lucy, is taken to the top of a mountain which is 320 m high. The chairlift she rides to the top of the mountain can deliver a seat to the top of the hill in 320 seconds. (16 mks)
 - a. What is the power required to deliver the snowboard racer to the top of the hill if they are sitting alone? (5 mks)
 - b. If the efficiency of the lift is only 60%, what is the total energy used? (3 mks)
 - c. When the racer is halfway down the hill, describe the energy transformation which has taken place, qualitatively. (4 mks)
 - d. If the racer's velocity is 75 km/hr at the bottom of the hill, how much energy was 'lost' to friction? (4 mks)

4. An oncoming skier is approaching a spectator at 80km/hr. The spectator is blaring a horn which sounds at approximately 670Hz. If the temperature is -20C, what frequency will the skier hear as they approach the spectator? And as they move away from the spectator? (9 mks)

5. Explain the motor principle and the RHR and describe one of its applications and how it functions. (Use diagrams if desired to illustrate your explanations.)
(13 mks)